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CONTENTS

MING MANDARIN SQUARES	5
<i>Schuyler Cammann</i>	
TWO REMARKABLE FIFTEENTH CENTURY CARPETS FROM SPAIN	15
<i>Louise W. Mackie</i>	
CLASSICAL GREEK TEXTILES FROM NYMPHAEUM	33
<i>John Peter Wild</i>	
PRACTICAL DEFINITIONS FOR THREE OPENWORK TECHNIQUES	35
TRADITIONAL BERBER WEAVING IN CENTRAL MOROCCO	41
<i>Sally Forelli and Jeanette Harries</i>	
A PERUVIAN CROSSED-WARP WEAVE	61
<i>Nancy Castle</i>	
HIGH-STATUS CAPS OF THE KONGO AND MBUNDU PEOPLES	71
<i>Gordon D. Gibson and Cecilia R. McGurk</i>	
BOOK REVIEW	97
<i>June Taboroff</i>	
TEXTILE MUSEUM BOARD OF TRUSTEES and ADVISORY COUNCIL	99
TEXTILE MUSEUM STAFF	99
BOOKS FOR SALE	100

COVER: Detail of a Mudejar carpet from Spain, second quarter 15th century, showing the coat of arms of Maria Enriquez, daughter of Alfonso Enriquez, 25th Admiral of Castile, on the front cover and the arms of Juan de Rojas on the back cover. Textile Museum 1976.10.2. Purchase, Arthur D. Jenkins Gift Fund and Proceeds from Sale of Art. (See Figure 2 in "Two Remarkable Fifteenth Century Carpets from Spain" by Louise W. Mackie.)

Transparency by Raymond L. Schwartz.

The views expressed by the authors are their own; they do not necessarily reflect those of the Textile Museum.

A PERUVIAN CROSSED-WARP WEAVE

NANCY CASTLE

Within the tradition of warp-faced weaving in the Andean highlands of Peru, designs are formed by the warps and depend on the color sequence in the warping and on the arrangement of these warps into a structure during weaving. Besides the intricate mantas and ponchos still woven according to this principle, narrow bands are also made as edgings for mantas, skirts, bags, and ponchos. Often they are joined to the larger pieces by their wefts, becoming an integral part of the textile. Other bands are: a braid as a sling or rope, a woven band as a tie in the hair, a strap on a coca bag, or a belt tie. These are strong and functional as well as decorative.

The bands used for these purposes vary in structure but most are warp-faced and warp-patterned. The narrow band discussed in this article is most commonly used for belt ties sewn to the ends of a wider complementary-warp patterned belt to secure it at the waist. Its construction is a type of crossed-warp weave involving the crossing of pairs of warps on its surface, the structure forming the design (Figures 1 and 2). Bundles of these bands are sold in the Saturday markets of Cuzco in a section where practical items for everyday use are spread out on the sidewalks. They are brightly colored, all about the same size, 1 cm. in width and 70-100 cm. in length. Their production, using not so much as an extra string or tool, involves no stationary points outside the weaver's body. The method of preparing the warps for weaving is simple. However, just by viewing the complex structure of the finished band, it would be impossible to reconstruct the method of weaving which depends solely on simple motions of the hand. The entire process of weaving this band was taught to me by an Indian woman in Cuzco on my request to learn any kind of weaving that she cared to teach that afternoon.

Apart from its production, the structure of this band is a crossed-warp weave (cf.

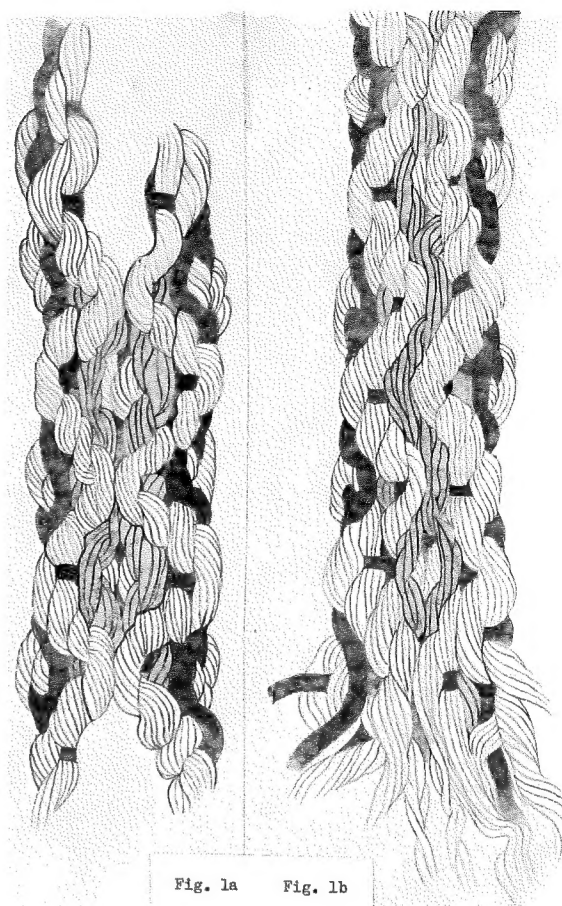


Fig. 1 Large-scale rendering of the crossed-warp band with diamond design A and zigzag B. Drawing by Annie Decker.

Emery 1966, p. 180) in which the warps cross over each other both singly and in pairs and then re-cross to their original order without spiralling or twining about one another. It will be noticed in the Figure 2 diagram that, except at the center of the design, the warps and wefts interlace 1/1. The design is formed by changing the direction of crossing of one color over the other. The crossing in adjacent groups may be either parallel or countered.

CONSTRUCTION—PREPARING THE WARP

The Indian woman in Cuzco sat on the ground with her legs straight out in front of her and chose three bright colors of 2-ply orlon that were re-spun and wrapped in tight balls and proceeded to wind a continuous warp around her left hand and right big toe.

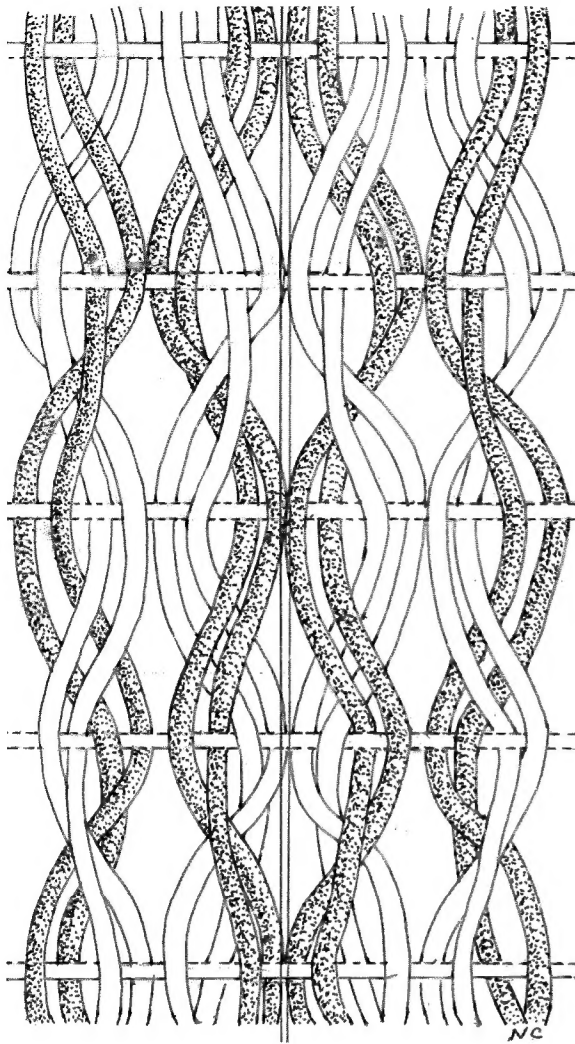


Fig. 2 Structural diagram of the crossed-warp weave.

re-cross S	re-cross Z
Z-cross	S-cross
re-cross Z	re-cross S
S-cross	Z-cross

Drawing by Nancy Castle.

The warping process as she taught it to me is described in Figures 3-8, and the formation of the cross for the initial wefts in Figures 9-12. The basic warping procedure is similar to that used for a backstrap or four-stake loom in the Cuzco area except that the warp is wound in a continuous spiral rather than a figure-eight, and no heddlng device is made for the shed opposite to the one held by the toe since the complex crossing of the warps in this technique can be accomplished only by finger manipulation. The type of cross which

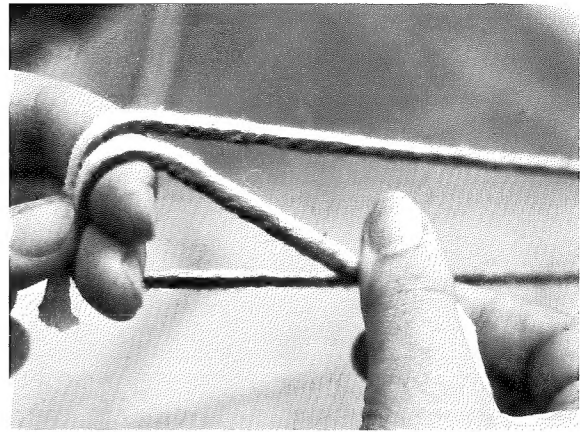


Fig. 3 One yarn in each of two colors (dark A and light B) is wound once from the left hand around the big toe and back to the hand. (Photographs for Figures 3-30 by Mary Troeger.)

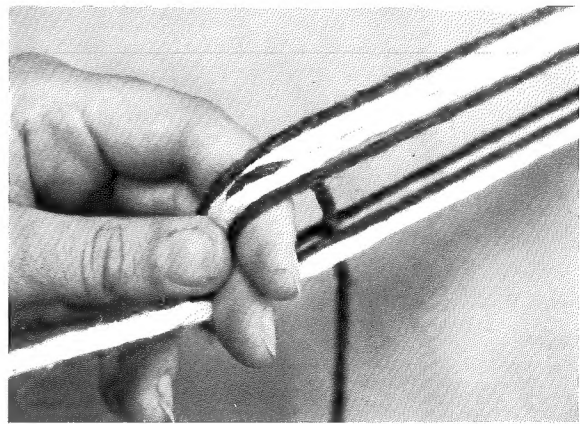


Fig. 4 The first color (dark A) is dropped in front of the hand and a third color (also dark C) is picked up. B and C are then wound in the same manner around the toe. At this point the left half of the warp has been completed.

produces plain weave (as in Figures 9-12) is formed only for the first wefts and serves to secure the order of the warps. Other manipulations producing the crossed-warp weave are substituted for the creation of subsequent sheds (see Figures 13-30). A total of sixteen warps is used. This is the only size that I have seen woven. It can be done quite easily with twice the number of strands, although anything much larger would present problems of manipulation without the use of sticks or heddles.

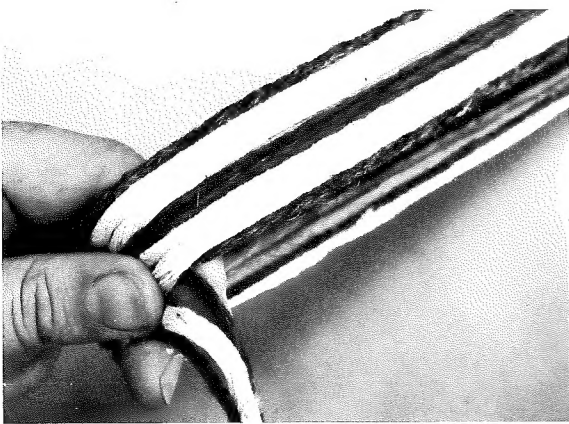


Fig. 5 For the right half of the warp the color order is reversed. The color sequence, AB/BC CB/BA, as seen above the index finger, is the same below it, a total of sixteen strands.

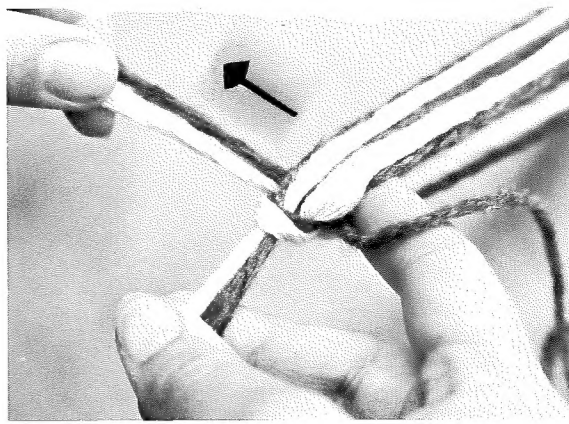


Fig. 8 Then they are wound twice around all the strands at the fingers to secure them. The remaining edge color A is cut about 50 cm. long. It becomes the weft, neatly matching the edge in color as is customary with much warp-faced weaving.



Fig. 6 The two hanging strands (B and C) are cut about 5 cm. from the thumb.

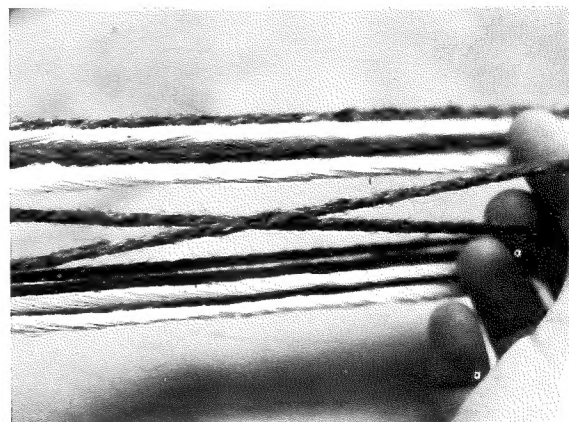


Fig. 9 A cross for plain weave is formed by taking each strand in its sequence and moving those of the upper plane to below the right index finger and those of the lower plane to above the finger.

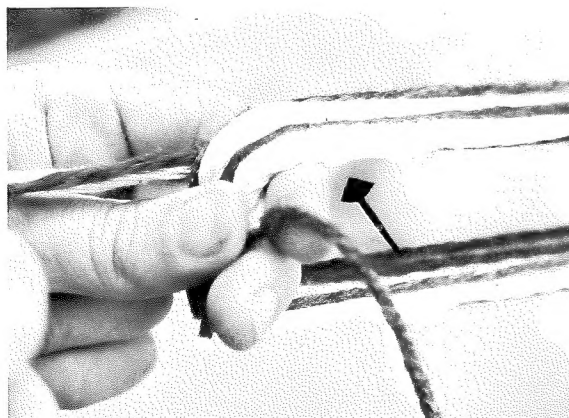


Fig. 7 These are passed between the two layers of warp.



Fig. 10 The completed cross.

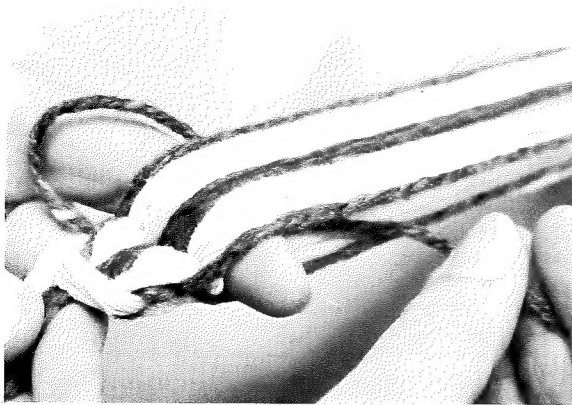


Fig. 11 This cross is gently pulled forward as far as it will go and the weft entered once.

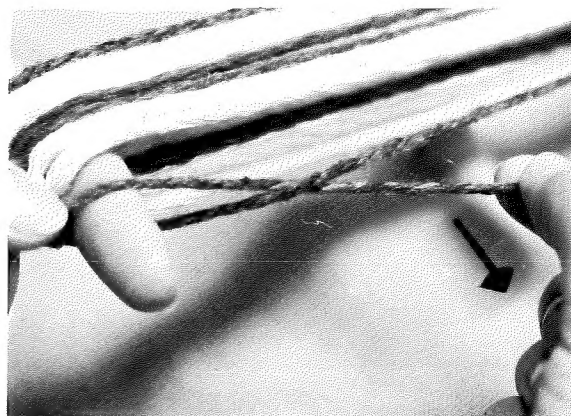


Fig. 14 Z-cross, step 1 continued. Rotation of this pair is continued in the same direction by grasping the yarn originally on top but now underneath and bringing it up to the right of its partner so that it is again on top and a half turn has been made.

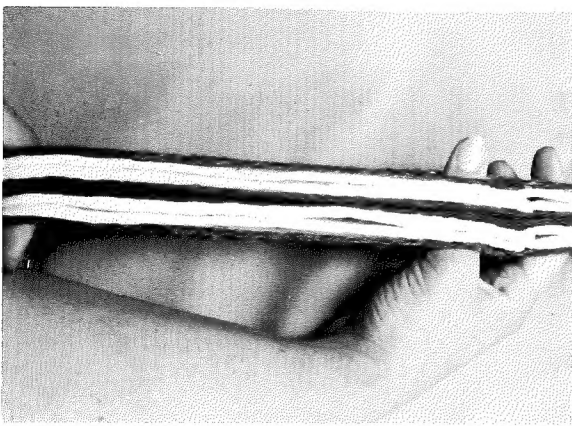


Fig. 12 The second cross that had formed higher up is then pulled forward and the weft entered again.



Fig. 15 Z-cross, step 1 completed. The position of the twisted yarns is held by the index finger of one hand while the other holds the warps under tension in the same shed as the toe.

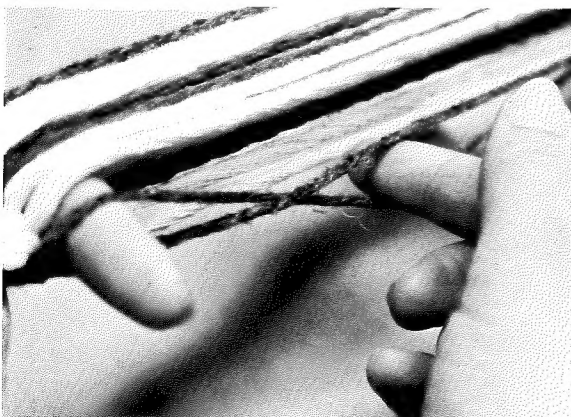


Fig. 13 Z-cross, step 1. With thumb and index finger the lower strand is brought up to the right of the upper strand so that their positions are now reversed.

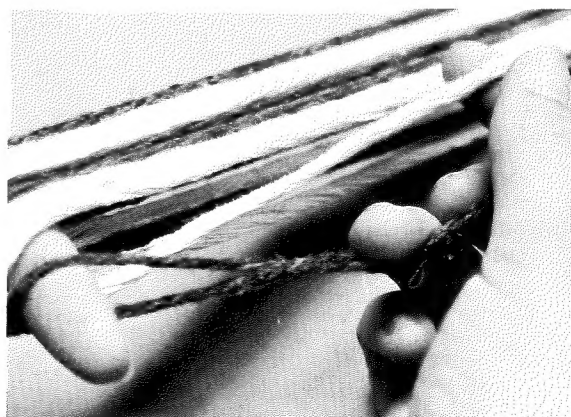


Fig. 16 Step 1 of the Z-cross is repeated as in Figures 13-15 with the next warp pair.



Fig. 17 Z-cross, step 2. The top yarns from each of the pairs in step 1 are brought down to the right of the lower two yarns. This rotates the yarns a half turn in the opposite direction from step 1.



Fig. 20 S-cross, step 1. With thumb and index finger, the upper strand is brought down to the right of the lower strand so that their positions are now reversed.



Fig. 18 Z-cross, step 2 completed. The pair on top at the beginning of step 2 is now below the index finger. The turns of step 1 have been partially unwound.



Fig. 21 S-cross, step 1 continued. Rotation on this pair is continued in the same direction by grasping the yarn originally on the bottom but now on top and bringing it down to the right of its partner so that it is again on the bottom and a half turn has been made.

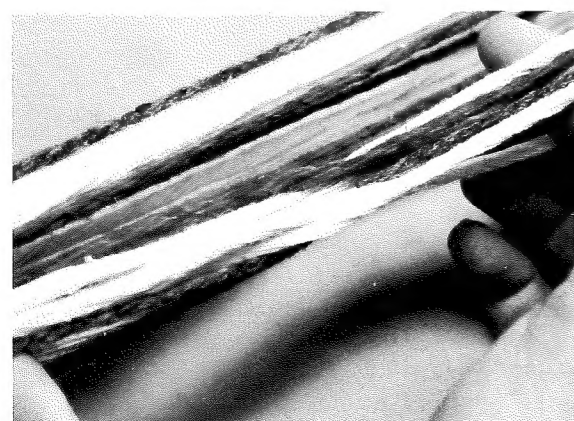


Fig. 19 The formation of the Z-cross is repeated, steps 1 and 2, as in Figures 13-18 with the next two warp pairs. At this point the center of the band has been reached where the color order of the yarns is reversed. The turning of the yarns will also be reversed in order to form a diamond design.



Fig. 22 S-cross, step 1 completed. The position of the twisted yarns is held by the index finger.

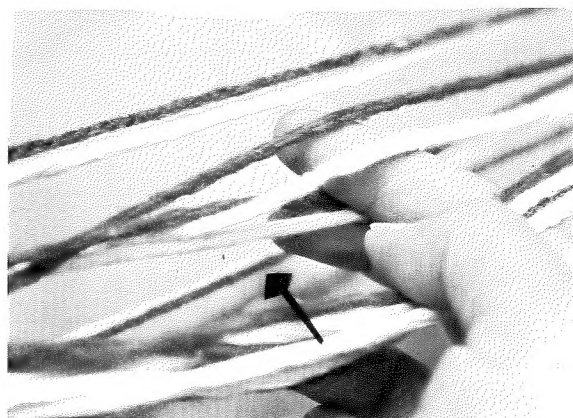


Fig. 25 S-cross, step 2 completed. The pair on the bottom at the beginning of step 2 is now above the index finger. The turns of step 1 have been partially unwound.

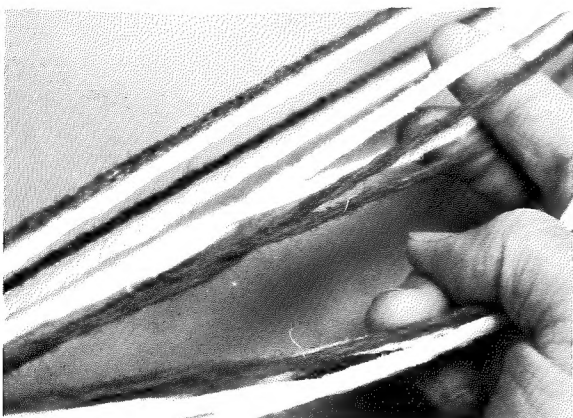


Fig. 23 Step 1 of the S-cross is repeated as in Figures 20–22 with the next warp pair.

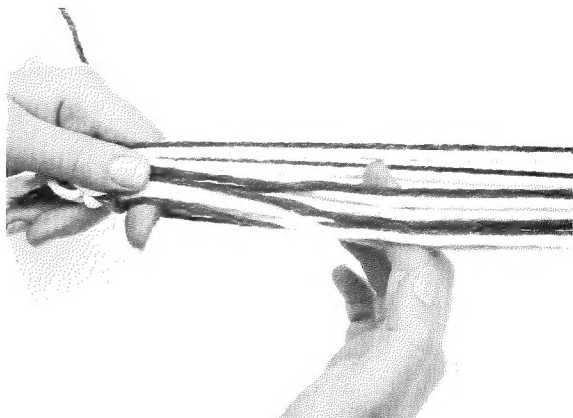


Fig. 26 The position of the warp ready to repeat steps 1 and 2 of the S-cross as in Figures 20–25 with the remaining two warp pairs. Notice that for each completion of a Z-cross on the right side or an S-cross on the left side of the band the color in each group which is closest to the center of the band has moved diagonally outward.

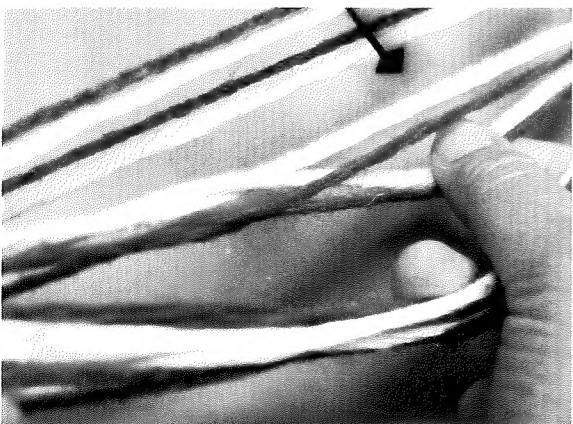


Fig. 24 S-cross, step 2. The bottom yarns from each of the pairs in step 1 are brought up to the right of the upper two yarns, thus the yarns are rotated in a half turn in the opposite direction from step 1.

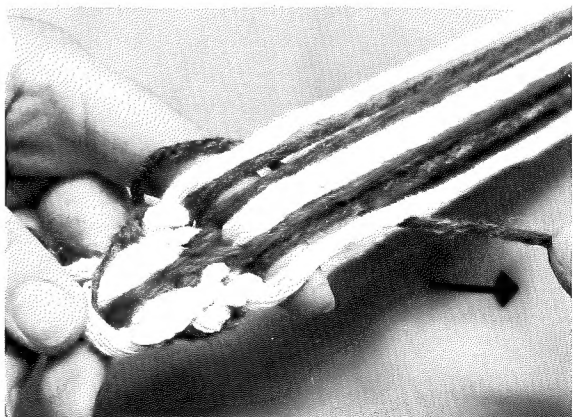


Fig. 27 The completed crosses held on the index finger are pulled gently forward against the web and a weft is inserted.

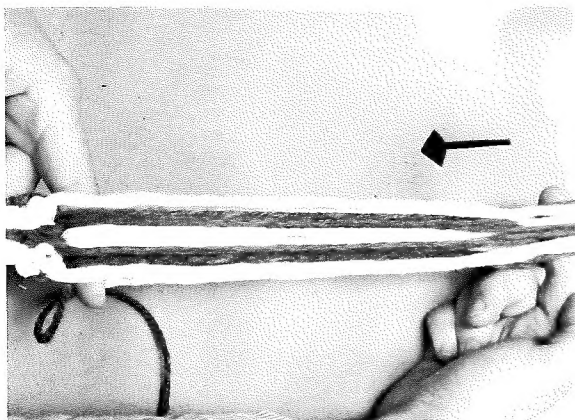


Fig. 28 Re-crossing. Reaching up on the warp, the right index finger is placed into the space held by the toe above the second crosses that have formed. These crosses are pulled forward and another weft is inserted. Notice that the diagonals of color have been inverted and the warp is clear of any crosses.



Fig. 30 Re-crossing. Weft inserted in the shed formed by pulling the second crosses formed in Figure 29 forward.



Fig. 29 The weft is inserted in the shed formed by reversing the direction of the crosses, that is, forming S-crosses on the right side of the warp and Z-crosses on the left side of the warp. Notice that in this case, the color in each group further from the center of the band has moved diagonally inward, and it has inverted to complete one full diamond repeat.

CONSTRUCTION—WEAVING

There are two possible ways to manipulate the warps by hand in the weaving of this crossed-warp structure. Both are essentially the same, differing only in the direction in which the warps are turned and then cross over each other. One causes the warps crossing over on the upper surface to lie in the Z-direction (Figures 13-18) and the other results

in the upper warps lying in the S-direction (Figures 20-25). The warps on the lower surface cross in the opposite direction to those which lie above them. The structure, then, of each type of cross is identical, only the face is turned.

Since all the warps are in a fixed stretched position, every time a warp is crossed at the web, a corresponding cross is formed further up on the warp. In this technique, these upper crosses are pulled forward in a second shed after the first crosses have been made, returning the warps to their original parallel positions. This motion of pulling the second shed forward produces the corresponding re-cross of the warps: the Z-cross re-crosses in the S-direction and the S-cross re-crosses in the Z-direction. Thus, if, as described in Figures 13-28, Z-crosses are formed on the right side of the warp and S-crosses on the left, these crosses together with the corresponding re-crosses will produce a diamond design on the upper surface and an "X" on the opposite face. Reversing the position of the cross direction as in Figures 29-30 will produce the "X" configuration on the upper surface and the diamond on the back. Alternating these two produces a design of linked diamonds as in Figure 1-a.

The color arrangement is designed to coincide with the warps in each part of the cross so that the crosses are dominant visually as well as structurally. Each cross is composed

of two warp pairs of contrasting color, for a total of four interworking warps. In the weaving process the warps are divided into two planes, with one warp of each color on the upper plane and one on the lower plane. Each of the two basic types of crosses (S and Z) is formed in two steps. In the first step (Figures 13-16 or 20-23) two pairs, each consisting of one warp of the same color from each plane, individually twist in a half turn on themselves. In the second step (Figures 17-18 or 24-25) the two pairs are taken together and allowed to untwist a half turn (opposite to the direction of twist in step 1). The result of these movements is that two warps of one color cross on top of the two warps of the other color and, in addition, the two warps of the same color also cross each other (see Figure 2).

In an adjacent group of four warps with the color arrangement in reverse (AB/BA) but worked with the cross in the same direction, the line of the structure and the pattern will be parallel but in a contrasting color. If in addition for each group of four warps an S-cross recross Z in one row is followed by the reverse cross and recross (Z-S) in the next, which also brings up the alternate color, then the Z section of the S-cross recross Z is in the same color as the Z section of the Z-cross recross S diagonally above forming a continuous diagonal line.

ALTERNATE METHODS

The order of the weaving process as described in Figures 13-30 differs in one respect from the way in which it was first taught to me. The Indian woman waited until I had successfully completed the turns of step 1 with each warp pair across the entire warp, holding all of them carefully on my finger. Only then did she go back to the first pair and flip the warps in each group back in the direction they had come from (step 2), forming a neat diagonal movement of one color across another. It was after this that I was instructed to do both steps 1 and 2 in sequence for each group of four warps. Clearly, she was emphasizing the twist of the warps which disappears from the final structure as it unwinds to form the cross.

The Peabody Museum of Archaeology and Ethnology in Cambridge has a specimen

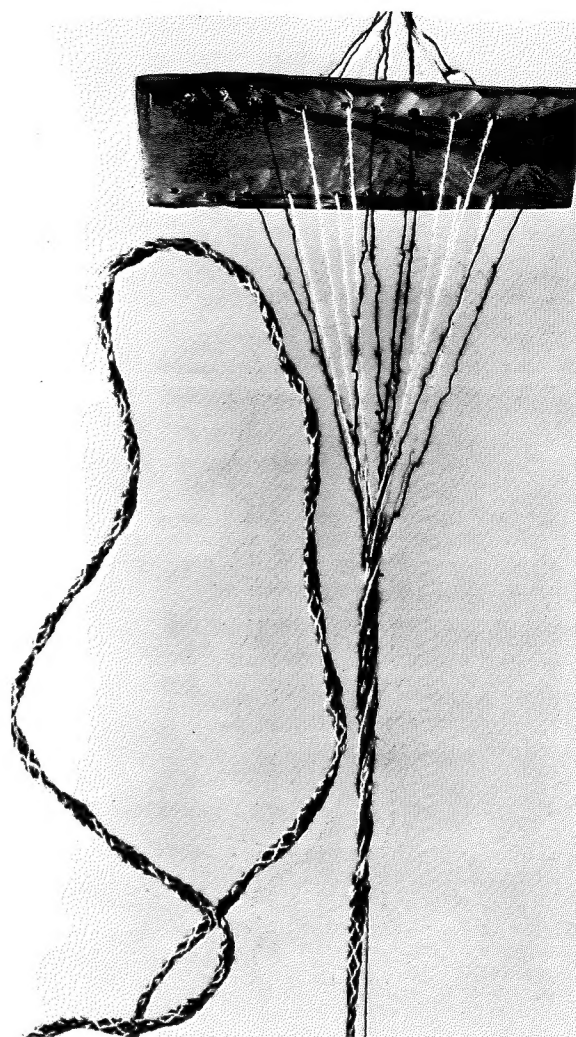


Fig. 31 Loom for "silku taula". Chucuito, Peru. Peabody Museum of Archaeology and Ethnology, Cambridge, Mass., 45-25-30/3916. Photograph by Hillel Burger.

with an alternate set-up for the same band presented here (Figure 31). It has a single wooden slat (17 cm. by 5 cm.) with holes through which the warps pass. There are twenty crudely shaped holes, only sixteen of which are actually used, drilled in two horizontal rows. The warps are tied together at one end after passing through the holes. Obviously, the use of the wooden implement allows for a warp much longer than the distance from toe to waist (the length of the warp in Figure 31 is 177 cm.). During weaving it seems to do nothing more than keep the shed open in much the same manner as the toe.

By weaving in the method described, the exact structure and pattern of the partially woven band in Figure 31 could be continued. Its structure and design are identical to the band taught to me by the woman in Cuzco. It was collected by Harry Tschopik in 1940 from the Aymara village of Chucuito on the south Peruvian side of Lake Titicaca. In his article Tschopik describes Aymara woven designs as being characteristically simple (1946, p. 535). He mentions band and belt weaving as well as the weaving of larger cloths, but does not describe these processes in detail. A label attached to the Peabody Museum specimen gives the native name, "silku taula." *Silku* in the Aymara language apparently refers to several types of bands or ribbons. In a 1583 Aymara-Spanish dictionary (Bertonio, 1879) various kinds of *silku* are defined. These definitions, as translated from the Spanish, are as follows:

Silku—a ribbon or fringe which surrounds the manta, having many names.

Ocollo hayra silku—ribbon of many eyes [i.e. diamonds].

Laku silku—ribbon of many worms [i.e. zigzags].

Achancora silku—also, ribbon of many eyes.

Achachu silku—ribbon which is made for a poor mantle (without fringe) which is made on the side, but which is done by sewing [i.e. instead of weaving].

Kora silku—ribbon made of one color or undyed wool.

DESIGN VARIATIONS

It has been noted already that reversing the direction of the cross in the center of the band produces a countered structure and hence a diamond color arrangement (Figure 1-a). If, on the other hand, all the crosses in each row are in the same direction, a parallel structure and a zigzag color arrangement results (Figure 1-b center). These are the most common traditional designs formed by this technique.

Nevertheless, other variations are possible, though the reversal of the cross direction from row to row (not counting the re-crosses) and the alternating color arrangement (so that pairs of two different colors are worked together) should be maintained in

order to preserve the structure and its visual effect. In one possible variant, the two groups on each side of a four-group band may be worked with the crosses countered instead of parallel, forming a smaller scale diamond design (cf. Cason and Cahlander 1976, upper half of photograph on p. 135). Another variation, reported by Ann Rowe (1977, p. 102, Figure 121 left), has the warp pairs twisted a full instead of a half turn in step one, then untwisted the usual half turn. The diamond design formed is basically similar to that in Figure 1-a but the extra twists are visible in the diagonals which form the diamonds and make the diamonds slightly larger. Marjorie Cason and Adele Cahlander (1976, p. 137) describe a third variation, in which the color order of the warp pairs is ABCAACBA instead of ABCCBBA and the B and C colors exchange positions in alternate rows of crosses in order to produce a diamond in the B color on one face of the band and in the C color on the opposite face. The colors may exchange faces by omitting the change of position in one row where it would otherwise be necessary. Robin Woodhouse has devised yet another variation in which the second crosses are accumulated for four rows at the far end of the warp before being pulled forward and woven (Woodhouse 1977, pp. 15 and 16, center). These variations by no means exhaust the possibilities of this technique.

ACKNOWLEDGMENTS

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Ms. Castle lived in the Cuzco region of Peru during 1974-1975 learning the processes of weaving on the ground stake and body-tensioned looms of the Andean highlands people. Travel in Ecuador and Peru and a survey of pre-Columbian and Colonial textiles in Lima and Cuzco provided the basis for study of warp-patterned weaving in the field situation. In 1977 Ms. Castle participated in the Irene Emery Roundtable on Museum Textiles at the Textile Museum by presenting a video tape of a Bolivian warp-patterned weave.